* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to a suitable wet [to start a smoke-eliminating processing system, especially reduce the smoke dust in exhaust gas] exhaust gas desulfurization system, and its control unit.
[0002]
[Description of the Prior Art] The network of the typical smoke-eliminating processing system in the coal-fired thermal power station plant which consists of the conventional technique is shown in drawing 4 and drawing 5 . Generally at the time of a rated load, the description of the exhaust gas from the coal fired boiler which flows into the smoke-eliminating processing system shown in drawing 4 is about 140 degrees C in SO2 concentration of about 500 ppm, dust concentration about 15 g/m3N, and gas temperature. First, as for the exhaust gas which flows into an electrical dust precipitator 2, 99% or more of the smoke dust in it is removed, and dust concentration decreases to about 100 mg/m3N (0.1 g/m3N) at electrical-dust-precipitator 2 outlet. The pressure up of the exhaust gas which came out of the electrical dust precipitator 2 is carried out with the invitation popular use machine (it omits Following IDF) 3, it has heat recovered by the heat recovery machine 1, and is introduced into the wet exhaust gas desulfurization system 4 at about 90 degrees C. It is desulfurized and is discharged from the wet exhaust gas desulfurization system 4 by the gas temperature of about 45 degrees C, dust concentration about 15 mg/m3N, and SO2 concentration of about 50 ppm, with the wet exhaust gas desulfurization system 4, cooling, a dust removing, and after a temperature up is carried out to about 90 degrees C with a reheater 6, the pressure up of the exhaust gas is carried out with the desulfurization popular use machine (it omits Following BUF) 7, and it is discharged from a chimney stack 9. In addition, heat exchange of the heat recovery machine 1 and the reheater 6 is carried out through a heat carrier by the thermal crossfire tube 10, and in the case of the abnormal stop of the wet exhaust gas desulfurization system 4, in order to pass the exhaust gas of IDF3 outlet in a chimney stack 9 without carrying out desulfurization processing, the by-pass duct 11 and the bypass damper 12 are formed.
[0003] Although the above-mentioned smoke-eliminating processing system is a system with many track records which spread most until now, especially about chimney-stack inlet-port dust concentration, reduction to 5 mg/m3N has come to be required of 10 mg/m3N and a pan by strengthening of atmospheric control in recent years. The method which installs a wet electrical dust precipitator in the outlet of a reheater 6 further as a well-known technique for corresponding to such a low smoke-dust system may be adopted (for example, steam-generated nuclear-electric-power-generation vol.41, No.7,913 page -914 page).
[0004] However, in order that installing a wet electrical dust precipitator may make an installation cost and running cost rise, the smoke-eliminating processing system shown in drawing 5 for the rationalization is proposed. In the system shown in drawing 5 , the heat recovery machine 1 placed immediately after IDF3 shown in drawing 4 is transposed to the style side before an electrical dust precipitator 2, since the inlet gas temperature of an electrical dust precipitator 2 falls in this case, the

electric resistance of a gas duct falls sharply, and the dust collection property in an electrical dust precipitator 2 rises. Therefore, by this method, 30mg [/m] 3 or less Ns of dust concentration in electrical-dust-precipitator 2 outlet can be attained easily, consequently wet exhaust gas desulfurization system 4 outlet dust concentration is also reduced by less than [10 mg/m3N].
[0005] However, in the case of the smoke-eliminating processing system of drawing 5 , in order for exhaust gas temperature to fall at heat recovery machine 1 outlet, it is necessary to take into consideration about the corrosion prevention measures of an electrical dust precipitator 2, IDF3, and the gas duct between these. Since especially the exhaust gas temperature from a boiler is greatly influenced with atmospheric temperature and a load, as for heat recovery machine 1 inlet gas temperature, about 140 degrees C may fall to about 100 degrees C at the time of rating of point **, and at this time, since heat recovery machine 1 outlet gas temperature falls to about 70 degrees C, it becomes close to the moisture saturation temperature of exhaust gas, and it has the influence of SO3 which exists in exhaust gas, and serves as corrosive environment. Therefore, use of a corrosion resisting material is required of the device and gas duct on the emission way after heat recovery machine 1 outlet. In the system shown especially in drawing 4 , a gas duct is only between wet exhaust gas desulfurization system 4 inlet ports from heat recovery machine 1 outlet. Although there are also few costs of corrosion prevention measures since the die length is also short, in the system shown in drawing 5 , an electrical dust precipitator 2 and IDF3 will be installed in the exhaust gas gas duct of a before [from heat recovery machine 1 outlet / wet exhaust gas desulfurization system 4 inlet port]. Moreover, since the die length of the gas duct of the section concerned also became very long, the costs which corrosion prevention measures take became huge, the effectiveness of an abbreviation of the wet electrical dust precipitator by adopting this system was lost, and it had become the failure of utilization of this system.
[0006]
[Problem(s) to be Solved by the Invention] The above-mentioned conventional technique was not considered about the rational corrosion prevention measures of the device in the exhaust gas gas duct of heat recovery machine 1 outlet, but needed to use the very expensive corrosive ingredient for the high range. The purpose of this invention is offering the smoke-eliminating processing system which reduced the possible dust concentration of stable operation, without performing the expensive corrosion prevention measures of a device.
[0007]
[Means for Solving the Problem] The above-mentioned purpose of this invention is attained by the next configuration. that is The recovery heat from the heat recovery machine which collects the heat of the exhaust gas from a boiler, the dust catcher which removes the smoke dust in exhaust gas, the exhaust gas desulfurization system from which the acid gas constituents in exhaust gas are removed, and said heat recovery machine is used. In the smoke-eliminating processor equipped with the reheater for emitting into atmospheric air, after heating raw gas again From the upstream to a gas flow direction at the downstream A heat recovery machine, a dust catcher, an exhaust gas desulfurization system, The smoke-eliminating processor which arranges the preheater which arranges in order of a reheater and reheats the outlet gas of an exhaust gas desulfurization system further between an exhaust gas desulfurization system and a reheater, Or in said smoke-eliminating processor, in order to control dust catcher inlet gas temperature, it is the control unit of the smoke-eliminating processor which controls the heat exchanger duty of the raw gas by the preheater.
[0008] Here, said control unit can be considered as the configuration which controls the heat exchanger duty of the raw gas by the preheater based on the detection temperature signal of dust catcher outlet gas temperature. Moreover, in said exhaust gas desulfurization system, a preheater is halved in an order stage to a gas flow direction, and either is controlled at least, and one preheater can consider the preheater of another side as the configuration which controls the heat exchanger duty of raw gas, in order [of the control which maintains the vessel internal pressure of the control or this preheater which maintains exhaust gas desulfurization system outlet gas temperature beyond the set point beyond the set point] to control dust catcher inlet gas temperature beyond the set point. This preheater can use a steamy type gas heater, heating air entrainment equipment, etc. which control the heat exchanger duty of

raw gas by the flow rate using the steam of a boiler.
[0009]
[Function] The heat exchanger duty of a heat recovery machine and a reheater changes with the size of the difference of heat recovery machine inlet gas temperature and reheater inlet gas temperature. Therefore, by installing preheaters, such as a steamy type gas heater, in a reheater inlet port, controlling the heat exchanger duty of the raw gas in this preheater, and changing reheater inlet gas temperature, dust catcher inlet gas temperature can be raised more than the dew-point of a sour gas, the corrosion of the device arranged from a heat recovery machine on a down-stream emission way can be prevented, and the dust concentration of exhaust gas can be reduced to coincidence. In order to control the heat exchanger duty of the raw gas in this preheater, in addition to the approach of controlling the amount of heating of a preheater based on dust catcher inlet gas temperature, or said dust catcher inlet gas temperature, there is the approach of controlling the amount of heating of a preheater based on the temperature and the amount of emission of heat recovery machine inlet-port gas.
[0010] Moreover, although heat recovery machine inlet-port capacity and gas temperature change with the service conditions of a boiler a lot, since a preheater is designed on the severest conditions that serve as the gas-temperature minimum by capacity max, the heating area of a preheater is also designed greatly. And when it is a service condition with high heat recovery machine inlet gas temperature, even if it does not perform the temperature up in a preheater, heat recovery machine outlet gas temperature may satisfy the set point, but at this time, since the temperature gradient of heat exchanger tube inside and outside required to carry out the temperature up of the inside of a preheater may be small, preheater internal pressure falls and the condensation temperature in a heat exchanger tube also falls. Since Myst in exhaust gas collides and evaporates in the heat exchanger tube of a preheater, when the condensation temperature of said steam is low, evaporation of Myst in exhaust gas stops being able to happen easily, and it causes corrosion of a heat exchanger tube. Then, if the Myst evaporation in desulfurizing-plant outlet gas is taken into consideration, a preheater can be halved and the preheater for carrying out temperature up control for desiccation of exhaust gas desulfurization system outlet gas and the preheater for the temperature control of heat recovery machine outlet gas temperature can also be prepared chiefly.

[0011]
[Example] One example of this invention is explained with a drawing.
The schematic diagram of the smoke-eliminating processing system which becomes this example to example 1 drawing 1 is shown. The exhaust gas from a boiler (not shown) flows in order of the heat recovery machine 1, an electrical dust precipitator 2, IDF3, an exhaust gas desulfurization system 4, the steamy type gas heater 5, a reheater 6, the steamy type heater 7, BUF8, and a chimney stack 9. In this example, the description is to have formed the steamy type gas heater 5 in the outlet side of the wet exhaust gas desulfurization system 4 as compared with the smoke-eliminating processing system of drawing 5 , and supply of the steamy charging line 14 to a steam is attained at this steamy type gas heater 5. The steamy flow rate of the steamy charging line 14 is adjusted by the flow controller 17 by the flow control valve 15 of the steamy charging line 14 based on the signal from a thermometric element 13 and the signal from the steamy flow rate transmitter 16 of the steamy charging line 14 which were formed in heat recovery machine 1 outlet. Moreover, the heating degree of the steamy type heater 7 is adjusted by the temperature controller 20 based on the BUF8 outlet-gas-temperature detector 19 by the flow control valve 22 of the branch line 21 of the steamy charging line 14. The heat exchange of the heat recovery machine 1 is the heat exchange of heat recovery machine 1 inlet-port exhaust gas and a heat carrier. The heat exchange of a reheater 6 The heat exchange of this heat carrier and exhaust gas desulfurization system 4 outlet gas sake, If the heat recovery machine 1 and a reheater 6 are considered to be one heat exchanger in all as a whole, it is possible that heat exchange of the heat recovery machine 1 inlet-port exhaust gas in the smoke-eliminating processing system shown in drawing 1 is carried out to exhaust gas desulfurization system 4 outlet exhaust gas by said one heat exchanger (heat recovery machine 1+ reheater 6).
[0012] Therefore, when heat recovery machine 1 inlet port and outlet gas temperature are made into T1

and T2 degree C, respectively and reheater 6 inlet port and outlet gas temperature are made into t1 and t2 degree C, respectively, the heat exchanger duty Q of said one heat exchanger (heat recovery machine 1+ reheater 6) is expressed with a bottom type.
Q=K-A and **tm (1)
K: Overall coefficient of heat transfer A : heating area (sum total of the heat recovery machine 1 and a reheater 6)
**tm: Log-mean-temperature-difference **tm=(T1-t2)- (T2-t1)/ln {(T1-t2) /(T2-t1)} (2)
(1) A formula shows that Q becomes large, so that the temperature gradient of heat recovery machine 1 inlet gas temperature and reheater 6 inlet gas temperature is large. On the other hand, when a heat exchanger duty is considered from a gas side, since a heat exchanger duty Q is equal to the heating value which the gas which passes the heat recovery machine 1 lost, Q is expressed also with a bottom type.
Q=GxCx (T1-T2) (3)
G: Capacity (kg/h)
C: Specific heat (kcal/kgand**)
In order to plan the device after the heat recovery machine 1, and corrosion prevention of a gas duct and for the heat recovery machine 1 outlet gas temperature T2 to carry out temperature control, it turns out that it will become possible from (1) and (2) types for that that what is necessary is just to control a heat exchanger duty Q from (3) types if the inlet gas temperature t1 of a reheater 6 is controlled.
[0013] Therefore, the temperature control of the heat recovery machine 1 outlet gas temperature T2 becomes possible by controlling the steamy flow control valve 15 and adjusting reheater 6 inlet gas temperature so that the temperature (= T2) detected with the thermometric element 13 formed in heat recovery machine 1 outlet may be maintained at the set point. Since reheater 6 outlet gas is saturated gas including scattering Myst of the lean solution from an exhaust gas desulfurization system 4, it has corrosive here. For this reason, although the steamy type gas heater 5 needs to adopt an ingredient with corrosion resistance, by carrying out the temperature up of the exhaust gas desulfurization system 4 outlet gas with this steamy type gas heater 5, by evaporating Myst in the gas concerned and drying gas, corrosive is abolished and it becomes possible to make cheap the quality of the material of the reheater 6 of back wash. Therefore, it is desirable to perform control which carries out the temperature up also of the exhaust gas desulfurization system 4 outlet gas temperature t2 beyond the set point while the steamy type gas heater 5 maintains the above-mentioned heat recovery machine 1 outlet gas temperature T2 beyond the set point.
[0014] The 2nd example which becomes example 2 this invention is shown in drawing 2 . This example is for raising the controllability of the above-mentioned example 1, and adds the signal and the quantity-of-gas-flow signal 25 from the heat recovery machine inlet-gas-temperature detector 24 to the smoke-eliminating processing system of drawing 1 . And based on the temperature detecting signal and the quantity-of-gas-flow signal 25 of the heat recovery machine inlet-gas-temperature detector 24, the amount of need steams is calculated with a computing element 17, this is made into a feedforward signal, and the heat recovery machine 1 outlet gas temperature T2 performs feedback control based on the signal from a thermometric element 13 and the steamy flow rate transmitter 16 of the steamy charging line 14 further formed in heat recovery machine 1 outlet like the above-mentioned example 1.
[0015] The 3rd example which becomes example 3 this invention is shown in drawing 3 . This example divides the steamy type gas heater 5 into the smoke-eliminating processing system of drawing 2 further at preceding paragraph heater 5a and latter-part heater 5b, and a steam is supplied to each from the steamy charging lines 14a and 14b. Preceding paragraph heater 5a performs temperature up control for desiccation of exhaust gas desulfurization system 4 outlet gas, and latter-part heater 5b performs heat recovery machine 1 outlet-gas-temperature control. Therefore, the temperature control of preceding paragraph heater 5a is based on the detection temperature of preceding paragraph heater 5a inlet-gas-temperature detector 26a, and the detection temperature of latter-part heater 5b inlet-gas-temperature detector 26b. It carries out by adjusting flow-control-valve 15of steamy charging line 14a a by the temperature controller 27. The temperature control of latter-part heater 5b is based on a signal like the smoke-eliminating processing system of drawing 2 from the signal from the heat recovery machine

inlet-gas-temperature detector 24, the quantity-of-gas-flow signal 25, and the thermometric element 13 of heat recovery machine 1 outlet and the steamy flow rate transmitter 16 of steamy charging line 14b. By the flow controller 17 It carries out by adjusting flow-control-valve 15of steamy charging line 14b b.

[0016] As this example and characteristic effectiveness, when the heating area of the steamy type gas heater 5 required for heat recovery machine 1 outlet-gas-temperature control is comparatively larger than a heating area required for an exhaust gas desulfurization system 4 outlet-gas-temperature temperature up, it becomes effective. Generally, the design of the steamy type gas heater 5 is designed based on the conditions that heat recovery machine inlet gas temperature is low, and the heating area also becomes large. In this equipment, when heat recovery machine 1 inlet gas temperature is a high service condition, heat recovery machine 1 outlet gas temperature may be satisfied also with not performing the temperature up in the steamy type gas heater 5, either of the set point. Although the steamy type gas heater 5 is used for temperature up desiccation of desulfurizing-plant 4 outlet gas at this time, since that heating area is very large, and the temperature gradient of heat exchanger tube inside and outside required to carry out a constant-temperature temperature up may be small, the vessel internal pressure of the steamy type gas heater 5 falls, and the condensation temperature of the steam inside the heat exchanger tube in a heat exchanger tube also falls. However, in the steamy type gas heater 5, it has the function to evaporate Myst contained while carrying out the temperature up of the desulfurizing-plant 4 outlet gas as described above. Since Myst collides with the heat exchanger tube of the steamy type gas heater 5 and evaporates by contact to a hot tube wall, the higher one of condensed mercury temperature is [the evaporation device of this Myst] desirable. However, when it is a service condition with high heat recovery machine inlet gas temperature, since the required heat exchanger duty is small, the temperature gradient of heat exchanger tube inside and outside of the steamy type gas heater 5 becomes small, steamy type gas heater 5 internal pressure falls, and the condensation temperature of the steam in a heat exchanger tube falls. case the condensation temperature of said steam is low -- the condensed mercury temperature of a heat exchanger tube -- low -- becoming -- evaporation of Myst in exhaust gas -- happening -- being hard -- it becomes the cause of the corrosion of the back-wash device of the steamy type gas heater 5.
[0017] then, the thing which the steamy type gas heater 5 will be halved, and temperature up control for desiccation of exhaust gas desulfurization system 4 outlet gas will be chiefly performed by preceding paragraph heater 5a, and will be done for the temperature control of heat recovery machine 1 outlet gas temperature by latter-part heater 5b if the Myst evaporation in desulfurizing-plant 4 outlet gas is taken into consideration -- things are desirable. Thus, according to the example of above-mentioned this invention, since heat recovery machine 1 outlet gas temperature can maintain irrespective of exhaust gas conditions beyond the set point, corrosion reduction of the device after the heat recovery machine 1 can be performed easily, and the dust concentration of a chimney-stack outlet can be reduced. moreover, by installation of the steamy type gas heater 5, since the temperature up in a reheater 6 can be lessened, the heating area of the heat recovery machine 1 and a reheater 6 can be reduced, the corrosion prevention measures of the back-wash device of the steamy type gas heater 5 can be further made unnecessary, and reduction of the whole installation cost can be aimed at.
[0018]
[Effect of the Invention] According to this invention, corrosion reduction of the various devices of a smoke-eliminating processing system can be performed easily, and the dust concentration of a chimney-stack outlet can be reduced without making the whole installation cost expensive.

[Translation done.]